

Creating, Doing, and Sustaining OER: Lessons from Six Open Educational Resource Projects

Prepared by: The Institute for the Study of Knowledge Management in Education (ISKME), September 2008

I. Introduction

A relatively recent global movement, the development of free-to-use open educational resources (OER) has generated a dynamic field of widespread interest and study regarding methods for creating and sustaining OER. To help foster a thriving OER movement with potential for knowledge-sharing across program, organizational and national boundaries, the Institute for Knowledge Management in Education (ISKME), developed and conducted case study research programs in collaboration with six OER projects from around the world. Embodying a range of challenges and opportunities among a diverse set of OER projects, the case studies intended to track, analyze and share key developments in the creation, use and reuse of OER. The specific cases include: CurriculumNet, Curriki, Free High School Science Texts (FHSST), Training Commons, Stanford Encyclopedia of Philosophy (SEP), and Teachers' Domain.

In presenting the case studies, this report aims to advance the field at large by contributing new knowledge as a basis for reflection on models and methods for project sustainability. Within the broader aim of knowledge-sharing, the specific goals of this report are two-fold. The first goal is to increase understanding of issues that are common across OER projects, such as engagement of online communities, collaborative content creation, and financial sustainability. The second goal is to facilitate synergistic networking possibilities for field-building and leadership development. In alignment with these goals, this report seeks to provide insights useful to other projects or funders of projects engaged in planning or initiating OER development. More specifically, the six case studies presented in this report aim to inform activities such as creating buy-in for new open content projects, establishing roles for iterative peer review processes, production, and workflow, and enhancing user engagement.

With hope for continuation of the learnings shared in this paper, it is offered freely to the wider open education community—projects, funders, researchers, and all others—to draw on insights of relevance, to adapt it, and to comment upon it. Furthermore, beyond this report, the findings from the case studies have been used to support the development of an OER Case Study Framework, which is a case study toolkit available to assist any open education project that wants to track, share, and advance its learnings and successes.¹ The long-term goal of the case study work has been to develop ongoing mechanisms for knowledge-sharing among OER initiatives worldwide, through all types of research, experience and stories.

¹ To post comments on this paper, and access the OER Case Study Framework as well as the individual case study reports, visit http://wiki.oercommons.org/mediawiki/index.php/OER_Case_Study_Project

II. Methodology

A. Overview and Rationale of Approach

This study draws upon a participatory case study methodology akin to David Fetterman's empowerment model. Empowerment research is designed to help organizations and communities to assess and improve their practices by establishing mechanisms that allow them to align their theory of action (what they think they should be doing) with their practices (what they are actually doing).² This type of research entails collaboration with the case study organization to develop research and data collection tools that can be used to reinforce, test and modify internal knowledge. As such, the role of the external researcher becomes that of a critical friend and facilitator, rather than an expert purveyor of knowledge. Consequently, the insights and experiences important to the organizational members are emphasized over those of the researcher, with the outcome being the cultivation knowledge to inform practices and continue improvement within the organization.³

Consistent with the participatory research model, the case study project was an iterative and collaborative process that resulted in research plan unique to each of the six OER projects. The ISKME research team first conducted a full participatory case study with the Free High School Science Texts (FHSST) project. The learnings from the FHSST case provided methodological insights for the development of the remaining case studies. Based upon research processes and tools developed in collaboration with FHSST, such as data collection protocols and tools for data analysis, ISKME researchers designed templates for data collection (survey protocols, interview guides, etc.) to guide and support the remaining five projects in developing and conducting their own case studies.

For all six projects, the process began with initial phone meetings between the ISKME research team and the project's management team. Subsequently, ISKME researchers conducted follow-up interviews, by phone or email. The purpose of these interviews was to shed light on the history and current state of the project, as well as key successes and challenges that emerged as the project evolved. For each project, ISKME researchers then conducted a review of internal documents to provide further insight regarding the project's goals, strategies, challenges and opportunities. Over the course of the meetings, interviews and document analyses, a case study research plan was collaboratively formulated and refined. Each plan included specific research questions, methods to explore those questions, a timeline, and an assessment of available human and technological resources within the project to support the research effort. Consistent with the participatory research model, the analysis and synthesis of the data and findings from each case

² Fetterman, D. (2005). "A Window into the Heart and Soul of Empowerment Evaluation: Looking Through the Lens of Empowerment Evaluation Principals." In *Empowerment Evaluation Principles in Practice*. Ed. David M. Fetterman and Abraham Wandersman. New York: The Guilford Press.

³ Petrides, L. and Loesch-Griffin, D. (2005). "Strengthening Evaluation for Continuous Improvement Through Knowledge Management." Working Paper, Institute for the Study of Knowledge Management in Education, Half Moon Bay, CA.

study were iterative and collaborative. ISKME provided leadership and quality control throughout the process.

The sections below provide an overview of the six case study projects, including a brief description of their activities, the case study issues and questions addressed, and the specific data collection methods used to explore and answer the case study questions. Subsequently, the participatory methodology is discussed in more detail, addressing its limitations and advantages according to the case study project leaders.

B. Overview of Cases

The six cases selected for this study were chosen due to their willingness to work in a participatory manner to explore, track, assess and share their successes and challenges. Interested in research as a means of self-evaluation and improvement, all of the case study projects were also willing to share their learnings with the wider OER community. Each of the case studies was also chosen on the basis of milestones reached in successfully creating opportunities around the creation, use and sustainability of open educational resources. For example, Free High School Science Texts, which was created in 2002 by five individuals with a vision for improving South African education through the creation of a single science textbook, has evolved into a multiple textbook project in which volunteers from dispersed areas of the globe have successfully collaborated to create content that meets national curriculum standards as well as local teaching and learning needs. As shown in Table 1, the six case studies addressed a wide range of often overlapping themes—from content production and licensing, to user engagement, to financial sustainability, to ensuring resource adaptability.

Table 1. Overview of Case Study Projects and Themes Addressed

Project Description	Themes Addressed by the Case Study
<i>CurriculumNet (Uganda)</i> An initiative of the Ugandan Ministry of Education to collaboratively develop, test, and integrate electronic instructional materials into existing Ugandan curriculum	<ul style="list-style-type: none"> • Supporting collaborative authorship of resources • Sustaining the project financially
<i>Curriki (U.S.)</i> A wiki-based website where teachers and learners can find, create, and edit resources, and collaborate and share ideas	<ul style="list-style-type: none"> • Facilitating use and user engagement around resources
<i>Free High School Science Texts (South Africa)</i> An initiative to collaboratively create free math and science textbooks for South African high schools using an online platform and drawing on volunteers globally	<ul style="list-style-type: none"> • Supporting collaborative authorship of resources • User feedback and testing • Sustaining the project financially
<i>Training Commons (India)</i> An initiative to collaboratively develop freely available online resources for training managers of community centres (telecentres) in 600,000 villages in India	<ul style="list-style-type: none"> • Building awareness and support for “open” and for the project overall • Supporting collaborative authorship of resources • User feedback and testing • Sustaining the project financially

<p><i>Stanford Encyclopedia of Philosophy (U.S.)</i></p> <p>A searchable, online, philosophy reference work that is freely accessible to students, instructors, self learners and others. The project has developed a long-term funding model predicated on contributions from the global academic library community</p>	<ul style="list-style-type: none"> • Sustaining the project financially
<p><i>Teachers' Domain (U.S.)</i></p> <p>An online repository of multimedia open educational resources, many of which have been converted from proprietary content into resources that are freely available for use in teaching and learning</p>	<ul style="list-style-type: none"> • Building awareness and support for “open” and for the project overall • The process of transitioning to an open model • Facilitating use and user engagement around resources

The following sections describe each of the case study projects in greater detail, providing background information as well as further discussion of their respective challenges and issues addressed by the case study research.

CurriculumNet

In 1997, Uganda’s president instituted free Universal Primary Education (UPE). As a result, primary and secondary attendance rates rose dramatically, as students from within Uganda as well as from neighboring East and Central African countries entered the country’s free educational system. The National Curriculum Development Center (NCDC), an office under the Ugandan government’s Ministry of Education and Sports, proposed using Information and Communication Technologies (ICTs) to assist in addressing the curriculum needs of the growing student population in both rural and urban schools in Uganda.

The NCDC is responsible for developing and evaluating curriculum for pre-primary, primary, secondary and post-secondary levels of education in Uganda. In 2002, NCDC sought and received funding from the Canadian International Development and Research Centre (IDRC) for its CurriculumNet project. The goal of CurriculumNet has been to develop, test, and integrate ICT-based instructional materials and teaching into existing Ugandan curriculum. The project was undertaken as a participatory effort, wherein curriculum experts and teachers were trained and supported in the collaborative development of ICT-based curriculum, and in delivering the curriculum electronically in their local classrooms.

Although CurriculumNet has successfully developed ICT-based curriculum for primary and secondary schools in Uganda, it faces challenges in sustaining the project going forward—specifically in terms of securing new sources of funding, and also with regard to meeting the technology and other infrastructure requirements needed to support teachers as they continue to develop and use the content in their local classrooms. In light of this, the CurriculumNet case focused the project’s collaborative curriculum development process, as well as the opportunities and challenges faced by the project overall.

Curriki

Curriki was founded to provide teachers and students around the globe with open access to high-quality educational resources. Curriki is a wiki-based website where freely available open

educational resources are developed and distributed to anyone who wants to use them. Curriki offers more than 18,000 resources corresponding to a wide range of subject matter, including information and media literacy, science and mathematics, foreign languages, and social studies. Through a variety of tools, the site allows teachers, students, and other individuals to create and join groups, access, share, and create resources, and build communities around improving curriculum.

Curriki has designed its site with the goal of providing an engaging and easy to navigate platform, with resources that are easy to find, usable and adaptable to local teaching and learning needs. In order to inform Curriki's success in reaching their design goals, this case study explored key aspects of use and user engagement, including how often and why users visit Curriki, how they use and engage around the tools and resources offered by the Curriki site, and what factors help or hinder engagement and use. The goal of this case study has been to develop an understanding of the mechanisms and processes that may help to attract and sustain users over time, and to facilitate and enhance their experience of use, reuse and contribution.

Free High School Science Texts

Created in 2002, the Free High School Science Texts (FHSST) project began with a vision to draw on volunteers to create one high school science text that would be free and sharable for all South African teachers and learners, grades 10-12, and rapidly grew into a multiple textbook project, including physics, chemistry, life sciences, and mathematics. Because South Africa requires teachers to use materials that are aligned with the Ministry of Education's (MOE) curriculum guidelines, FHSST consulted early on with the author of the MOE guidelines, and used those guidelines to help teachers create outlines for textbook content. In the process of revising and refining their textbooks, FHSST conducted classroom trials to gather user feedback from teachers and learners, to identify content areas in need of improvement, with the goal of strengthening textbook quality with specific regard to local adaptability.

The increased scope of the project has necessitated an expanded circle of expert volunteers to assist in writing, editing, and compiling the textbook content. To meet the project's ongoing need to recruit and sustain an active core community of volunteers who continuously contribute high quality and specifically adaptable content, the FHSST case study has endeavored to identify processes and structures to expand and support volunteer engagement, including improved strategies for peer production, collaborative authorship, and workflow. In light of its goal to render the content creation process as volunteer-centric as possible, the FHSST case study also focused on strategies for supporting a positive and constructive online forum environment. While volunteers remain central to the FHSST project, external and administrative costs related to classroom trials, textbook quality control, printing and distribution, necessitate ongoing efforts to secure funding. In this regard, the FHSST case study also explored challenges and opportunities involved in securing and sustaining financial support.

Training Commons

In early 2004, India's *National Alliance for Mission 2007: Every Village a Knowledge Centre* was formed to establish telecentres in each of the country's 600,000 villages by the year 2007. A

telecentre is a community center that offers shared access to information and communication technologies (ICTs) for the purpose of community development and poverty reduction. A telecentre serves its community in multiple capacities: as a business resource, a service center, an Internet center, a space for community meetings, a library, and a place for learning new skills—from word processing and accounting, to farming techniques.

One key component of the National Alliance for Mission 2007 plan stipulated that each of India's 600,000 telecentres would be run by managers trained in specific skill sets which would allow them to serve the diverse needs of the communities they support. In recognition of the paucity of trained individuals to manage the telecentres, and of the resources necessary to train them, the Training Commons initiative was established to develop resources that could support trainers in their efforts to prepare future telecentre managers. In doing so, Training Commons sought to use a collaborative, open content approach which would draw upon the expertise of existing trainers in order to develop a "living curriculum" with materials that are free, accessible online, and easily adapted in light of the existing and future skill requirements of telecentre workers.

By successfully building partnerships with training organizations in India, identifying authors (trainers) with expertise in specific content areas, and establishing a workflow process to facilitate their ability to collaboratively create materials, the Training Commons initiative has resulted in the development of four freely available and open training modules. The aim of the Training Commons case study has been to understand and document the practices, processes, successes, and challenges of the partnership and the content development, and to assess the overall impact on stakeholders—including the trainers who use the materials, the managers (or trainees) who participate in the telecentre trainings, and importantly, the external OER community, which can potentially benefit from the lessons learned.

Stanford Encyclopedia of Philosophy

Stanford Encyclopedia of Philosophy (SEP) is a searchable, online, open access philosophy reference work freely available to the global academic community as well as the public at large. Created in 1995 by a senior research scholar at Stanford University, SEP is a dynamic body of reference, updated regularly by professional philosophers and editors from around the world. As contributors monitor emerging ideas in the field of philosophy, they incorporate those ideas on an ongoing basis in the form of new and updated entries. The charter for the encyclopedia explicitly allows for rival articles on a single topic to reflect reasoned disagreements among scholars.

In 2003, SEP, in line with its effort to become a self-sustaining resource that preserves open access, began exploring ways to move away from its initial grant-based funding structure. After weighing several options, SEP developed a long-term funding plan predicated on partnerships between the Stanford University and umbrella organizations representing the global academic library community. Under the model, university libraries or academic philosophy departments pay membership dues to an SEP endowment fund, in return for certain benefits, including protection on the money contributed, the right to download the SEP archives, and public recognition as supporters of open access and SEP. The goal has been to raise \$2.5 million from

the library community (alongside additional sums from a challenge grant and private and corporate donors), so that SEP can remain freely available to all.

Although SEP has successfully secured commitments from university libraries globally, approximately one-third of the \$2.5 million remains to be raised. A central obstacle identified by SEP has been securing new partnerships with libraries that currently use SEP and its resources, but which do not yet contribute to the fund. The aim of the SEP case study has been to shed light on this obstacle, specifically exploring the reasons behind libraries' potential disinterest in committing to the SEP fund, as well as assessing the reasons why participating libraries have, in fact, contributed. By exploring these issues, the study has sought to elucidate ways to secure additional commitments from libraries going forward. And in light of SEP's interest in creating a sustainable funding model that can potentially be adapted elsewhere, the study has aimed to inform knowledge about the factors impacting the success of their endowment model, as well as the feasibility and transferability of the model for future publishing projects.

Teachers' Domain

Launched in 2002 by the non-commercial television and radio broadcast service WGBH located in Boston, Massachusetts, Teachers' Domain is an online repository of multimedia OER for use in K-12 classrooms and for professional development. Teachers' Domain is unique in that WGBH independently created a new licensing structure specifically for its content. As part of its effort to enhance K-12 science education, WGBH has developed content from public media archives into high quality, open educational resources for Teachers' Domain. In the process, WGBH deepened its knowledge of and explored ways to shift public media content from a commercial licensing to an open content model.

The aim of the Teachers' Domain case study has been to examine the project's successes, challenges, and considerations involved in developing and leading an open content model, with specific regard to the viability of the model going forward for public media. Specifically, this case study has sought to shed light on the process of shifting public media archival content from a proprietary licensing model to an OER model, and to explore the impact of these activities, specifically in terms of the projects choices regarding licenses and permissions of use. In addition, this case study examined how teachers are using and working with the newly developed Teachers' Domain resources within the context of teaching and learning.

C. Case Study Questions and Data Collection Instruments

As noted earlier, the preparation for each case study research plan entailed conversations and interviews with project management teams, as well as document analysis to provide a fuller picture of the history and current state of each project, its goals, strategies, challenges and opportunities. Collaboratively and iteratively formulated, each case study research plan ultimately included specific research questions to explore the project's thematic concerns, as well as corresponding instruments for data collection appropriate to addressing those questions. A summary of the case study research questions and the instruments used to collect data in each case are provided in Table 2, below.

Table 2. Case Study Questions and Data Collection Instruments

Case Study Questions	Data Collection Instruments
<i>CurriculumNet (Uganda)</i>	
1. What processes and structures best facilitate the collaborative authorship of resources?	Interviews to understand project practices and challenges going forward (n=4)
2. What are the funding and infrastructure related challenges for the project?	Analysis of internal documents to understand project activities, successes and challenges
<i>Curriki (U.S.)</i>	
1. How often and why are users visiting Curriki?	Survey of users to understand how often they visit Curriki, their specific use behaviors, their incentives and disincentives to use, and whether and how they use and modify Curriki resources in the classroom (n=55) Follow up interviews with users to gain a qualitative understanding of the users' experiences with Curriki and with open educational resources more generally (n=3)
2. How do users engage around the Curriki site, its tools and its resources?	
3. What factors help or hinder engagement and use?	
<i>Free High School Science Texts (South Africa)</i>	
1. What processes and structures best facilitate the collaborative authorship of resources by volunteers?	Interviews with project leaders (n=3) Survey of volunteer authors addressing their perceptions of the project's volunteer recruitment and peer production process (n=6)
2. How can the project ensure that content remains continually relevant, usable and adaptable to local teaching and learning needs?	Follow up interviews with survey participants to gain a qualitative understanding of the volunteers' experiences and perceptions (n=3) Observations of activities on FHSST's discussion forums and authoring platform
<i>Training Commons (India)</i>	
1. How is partner buy-in created and sustained?	Interviews with project leaders, module authors, trainers, and future trainees (telecentre managers) to understand their perceptions of the process of creating the telecentre modules (n=23)
2. What processes and structures best facilitate the collaborative authorship of resources?	
3. How can the project ensure that content remains continually relevant, usable and adaptable to local contexts?	
<i>Stanford Encyclopedia of Philosophy (U.S.)</i>	
1. How is the SEP funding model perceived by libraries and consortia members?	Telephone interviews with select individuals from contributing and non-contributing libraries and library organizations, as well as individuals involved in the early design of the funding model to understand challenges and successes for the model (n=6)
2. What factors impact the willingness of libraries to contribute to the model?	
3. What opportunities and challenges exist for sustaining the model?	
<i>Teachers' Domain (U.S.)</i>	
1. What are the process, successes and challenges of transitioning from proprietary to open content?	Interviews with members of WGBH and Teachers' Domain core leadership team and a partner station to understand the practices, successes and challenges to the move toward open content (n=5) Survey of Teachers' Domain users addressing how they are using and working with newly developed resources (n=511) Follow up interviews with users to gain a more in-depth qualitative understanding of their experiences with Teachers' Domain and with open educational resources more generally (n=2)
2. How often and why users are visiting Teachers' Domain?	
3. How do users engage around the Teachers' Domain site and its resources?	
4. What factors help or hinder engagement and use?	

D. Discussion of the Participatory Methodology

An important part of the case study initiative was to help projects understand how exploration into research questions that are central to their experiences could help them advance their goals, and to support them as they built capacity to answer those research questions. As the facilitator of the case study initiative, ISKME provided support throughout the overall process—from the development of research questions, to the interpretation of data, to the sharing of findings and instilling of practices that lead to repeating the cycle anew. Each of the six projects was expected to actively participate in building their capacity for data gathering, reflective inquiry, and knowledge sharing. In this sense, the projects took on the role of internal researchers and capacity-builders, as with an action research model, guided by ISKME and supported with resources along the way.

On the whole, the case study research for each of the six projects was highly collaborative, with nearly all projects identifying key individuals internally who led or provided input on the various aspects of the research. However, some took on more of the research tasks than others. For the Curriki, Teachers' Domain, SEP, and FHSST case studies, project participants provided input on the research plan, helped to construct data collection instruments (such as surveys and interview protocols), and provided input on the analysis and synthesis of the data. For the CurriculumNet case study, the project had already conducted its own research into its successes and challenges; the case study thus drew upon ISKME's analysis of CurriculumNet's own research and reporting, as well as interviews with CurriculumNet's project leader. Finally, for the Training Commons case study, a researcher from the project's own team fully adopted the role of internal researcher, with ISKME providing ancillary support such as providing sample interview protocols and feedback on the data collection and analysis.

Upon completion of each case study, ISKME surveyed project leaders to understand the participatory research process from the perspective of those project leaders, specifically to shed light on how they perceived the case study research process overall, what they saw to be the benefits and challenges of the process, and whether they planned to use it again in the future. Project leaders indicated that they faced challenges in conducting the research during the timeframe that was required, as aspects of the research took more time than anticipated (for example, recruiting interview participants). Project leaders also indicated that they could have used more localized research support, such as a research tools and techniques workshop.

The benefits of the participatory research process, according to project leaders, were that the projects gained real feedback from their stakeholders, which allowed the project leaders to confirm their assumptions or to reassess their strategies in light of research data. Additionally, project leaders indicated they acquired research and data collection skills, which they planned to use again in the future. Finally, project leaders indicated that the case studies helped to illuminate strengths and weaknesses in their programs and provided a sense of where improvements needed to be made. The participatory research process was also said to spark new discussions and reflections among staff team members, which contributed to leaders' understanding of successes and failures in program operations and implementation, or signaled new avenues for exploration and research.

III. Findings

Although the shape, size, goals and dynamics the six of case study projects vary widely, the case studies share convergent themes and overlapping issues. The following discussion of findings and insights derived from the case studies addresses six main topics: a) the process of building and maintaining awareness and support for the concept of open; b) the process of transitioning to an OER model from a traditional, proprietary model; c) methods for facilitating and sustaining collaborative content creation, specifically in terms of workflow and mechanisms to support workflow; d) methods for user testing and feedback, to assure high quality resources; e) issues surrounding OER use, reuse and user engagement; and f) strategies for achieving financial stability. Drawing upon pertinent aspects of relevant case studies, the topics discuss each project in turn, followed by a summary of the insights obtained from case study. In addition, lessons gleaned from the case studies are set forth in sidebars as offerings to the wider OER field.

A. Building Awareness and Support for “Open”

Because the development of OER is a relatively new endeavor, many projects in the open movement necessarily become engaged in creating and maintaining a shared understanding and commitment around the concept of open among their stakeholders. Two of the case studies explicitly addressed the process of creating awareness and support for the concept of open: Training Commons in India and Teachers’ Domain in the United States. Both of these projects have solicited engagement from multiple organizations to transform or create resources from closed, proprietary systems to open systems. In the process, both have worked to develop a common understanding among stakeholders and potential stakeholders—content producers, funders, volunteers, and partners—regarding the benefits of OER. Teachers’ Domain sought to transform public media content from a commercial licensing to an OER model, and needed approval from multiple rights-holders to do so. Training Commons wished to create training materials and needed the participation of established organizations with existing training materials and knowledge about training.

Teachers’ Domain

As Teachers’ Domain began the process of shifting public broadcasting content from a commercial licensing model to an OER model, the project contacted rights-holders to obtain permissions and clearances. It soon became evident that many rights-holders were resistant to the concept of open. In particular, three key concerns surfaced:

- *Integrity of materials and control:* A prevailing concern among some rights holders was that if a portion of content were to be highlighted out of context, then that content would be perceived as having been altered or having lost its original integrity. Television producers were anxious that, for instance, interviewees in their documentaries might be less willing to share their thoughts and ideas openly if they thought that the material produced would later be modified and potentially taken out of context.
- *Attribution:* Many rights-holders were concerned that they might not receive the recognition or credit due to them as original author or rights-holder.

- *Commercial viability:* For owners of commercially-licensed content, actors and others who appear in the videos, fears of loss or diminution of the financial value of their work posed an obstacle. At the very least, the business benefits of open appeared as unknown.

Teachers' Domain discerned that many producers and rights holders were already comfortable with allowing materials to be used "for educational purposes only."⁴ However, they did not find a license that met this need, so the project developed its own licensing structure, designating resources among four categories: View Only; Download; Download and Share; and Download, Share and Remix. The license stipulated that the materials are open yet they must be used according to the designated category, and for educational purposes only. In short, Teachers' Domain found that in order to address the concerns of rights-holders, messaging needed to stipulate conditions of use, including that the content was for educational purposes only.

Training Commons

In October 2005, a workshop was convened in Chennai, India to introduce the purpose of the Training Commons project and to create a plan for the project's curriculum design. Trainers from sixteen organizations that had been involved in establishing telecentres and training telecentre managers were invited to attend. All of the trainers had expertise and prior experience with training in specific training areas. All had also expressed an interest in sharing their knowledge and learnings from their training experience with others. At the workshop, the invited trainers shared training models, identified training gaps, and developed a tentative vision for the development of a Training Commons program. They also created an implementation plan to guide the development of the Training Commons project.

In February 2006, a second workshop was held in Agra, India to define the vision for Training Commons and facilitate a stronger partnership among the trainers of the sixteen participating organizations around that vision. The vision as expressed was to develop collaboratively a freely available, common curriculum that would draw on the expertise of trainers and their organizations, and that could be used and adapted in multiple telecentre training contexts. Once the vision was established, the workshop participants finalized the focal training areas for content creation. These included entrepreneurship, grassroots marketing, grassroots communication, community building, and infomediary skills.

Lessons from the Field: Building Awareness and Support for Open

Assess Stakeholder Concerns—Assess the needs of stakeholders in terms of their concerns, anxieties, and hesitations toward open in order to inform messaging around the meaning of open within your project, as well as strategies for creating and maintaining buy-in.

Develop Participatory Messaging—Develop and share messaging around open and the goals of the project that is rooted in the needs, perceptions and concerns of key stakeholders.

Acknowledge Cultural Context in Approaching Stakeholders—Take the temperature of the hierarchical structures prevalent in the organizations or groups with which partnerships are being formed, and where buy-in needs to occur. This entails assessing which constituents should be approached within these organizations, and if there are multiple parties, which of them need to be approached first.

⁴ Teachers' Domain defines educational purposes in terms of use "for the primary purpose of learning or teaching in both formal and informal educational settings, use by educators or students in classrooms, libraries, schools and at home, and/or the presentation of materials to an individual or a group for the purpose of learning or teaching."

In attempting to maintain interest and continued buy-in around the project vision, Training Commons project leaders emphasized the longer-term value of sharing across telecentre networks using a concept for multiplying returns, whereby an organization produces one module but receives three in return. Although this messaging served to create interest and buy-in early on in the project, Training Commons also began to encounter some hesitation from the participants' senior-level decision makers who were concerned about "giving away" their years of experience and expertise in the form of OER training materials. This concern was acute among leaders who were operating telecentres as franchises, which earned revenue for parent organizations.

After the two workshops, only three of the sixteen original organizations joined the project. One organization joined the project at a later stage. Beyond some hesitancy on behalf of a few of the organizations around sharing their proprietary knowledge, this in part stemmed from the approach taken by the Training Commons team in forming the partnerships in the context of India's social organizational structure, which is predominantly hierarchical. The initial invitations to the trainers for the Chennai and Agra workshops had overlooked the senior-level decision-makers at several training organizations. In retrospect, the Training Commons project leaders learned that—in light of the predominantly hierarchical social organizational structure that is prevalent in India—first sharing the project vision with senior-level decision-makers of the potential partner organizations would have likely facilitated their continued engagement in the project. Once their participation was secured, the senior-level decision makers would then, ideally, have been asked to identify training personnel who could be invited to the workshops. In short, because the partnerships were formed through the trainers first, the Training Commons project leaders confronted difficulties in consolidating partnerships with the identified organizations.

Furthermore, inconsistent communication also played a role in the reduction in the number of partners. Ongoing and consistent communication surfaced as a challenge for the Training Commons project leaders, primarily due to limited resources (e.g., time, human capital, capacity), staff turnover within the Training Commons team, and variations on the part of the training organizations and trainers with regard to communication technologies. The Training Commons project leaders indicated that in hindsight, the resources, capability and expectations for communication among the partner organizations and the Training Commons initiative should have been established early on in the project to build agreement about how to move forward.

Summary of Case Study Insights

As the Teachers' Domain and to some extent the Training Commons case study revealed, projects seeking to transform proprietary content into OER may encounter hesitancy among rights-holders. These might include: fear of loss of control of content when derivative versions may use segments out of context, or anxiety regarding loss of attribution, or worry that the commercial value of their work may be diluted and lost. As projects work to create shared understanding around the concept of open, assessment of such issues can help to inform messaging around the meaning of open, and evolve strategies for creating and maintaining buy-in. Explaining protections involved in opportunities for "educational use" may facilitate acceptance and buy-in for open, as with the case of Teachers' Domain. Other options for creating buy-in include co-creation of

vision, as well as innovative frameworks for multiplying participant returns on OER, such as the “give one, get three” concept employed by Training Commons.

Moreover, as revealed by the Training Commons case study in particular, cultural context plays an integral role in determining whether OER partnerships and buy-in are secured and sustained. For Training Commons, the hierarchical structure prevalent in Indian organizations played a key yet neglected role. For other projects, taking the temperature of needs, hierarchical structures, and tacit assumptions prevalent in the organizations or groups with which partnerships are being formed, and where buy-in needs to occur, may help to create the conditions necessary for sustainable partnerships.

B. Transitioning to Open Content

Beyond the need to create and sustain a shared understanding around open, the process of transitioning proprietary materials to open educational resources presents a range of challenges and opportunities. The Teachers’ Domain case study in particular revealed several insights into the complexity of the process—from the early stages of conducting a legal assessment of existing content, to the final quality control of the newly opened content. On a fundamental level, Teachers’ Domain and its partners learned that the transition required more resources than anticipated. Legal issues and technical production entailed complex and interdependent issues.

Teachers’ Domain

Given the complexity of transitioning content from public media archives with a commercial licensing model to an open educational resource model, the Teachers’ Domain case study highlighted the need for preliminary assessments—legal, technological, and pedagogical—to determine the viability of converting materials to open. For Teachers’ Domain, the process of legal assessment presented an array of challenges, as the nature of the materials in its archives required them to work with numerous proprietary entities, each with differing claims to content rights.

WGBH began the process of shifting resources from proprietary to open content by analyzing and categorizing each resource and its elements⁵ by the type and extent of rights clearances necessary to shift to an open licensing model. Specifically, the project worked closely with legal staff to determine the appropriate rights profile for the resources based on the resources’ existing licenses. Each element within a resource was assigned one of four categories. These included:

- Level 0 – Not available for open access. The user can view the media resource only on the Teachers’ Domain website
- Level 1 – Download allowed. The user can download the media resource to a local computer or device
- Level 2 – Download and reuse allowed. The user can embed the entire media resource in a non-commercial educational presentation or email it to a colleague, as long as its use

⁵ Each resource is composed of smaller pieces, which are here referred to as elements. For example, a video clip or segment could contain ten or more shorter video shots. It could also contain interviews with individuals, a narrator’s voice, music, etc. Each of these is an element that has rights associated with it.

remains non-commercial and educational, the entire asset is used, and the source is acknowledged

- Level 3 – Download, reuse and remix allowed. The user has the right to re-edit any of the individual elements of the media resource to create a derivative work. The derivative work may only be used for non-commercial educational purposes and the source must be acknowledged

Once the individual elements were categorized, the resources that they comprised were also assigned a level. The level assigned to a resource was determined by its most “restrictive” element. Thus, if a resource was comprised of, e.g., three elements, with one being Level 1, and the other elements being Level 2, the resource would be categorized as a Level 1 resource. The project also assessed technological characteristics of each resource to determine its suitability for open educational purposes. Specifically, the technological assessment evaluated whether the content was, e.g., downloadable and remixable. The resources were then examined from a pedagogical perspective to assure that they would meet the needs of teachers, specifically by considering existing gaps perceived by teachers in terms of access to content.

Upon completion of the legal, pedagogical and technical assessments, the project identified those resources that were potentially eligible to migrate to higher level of use (e.g., from Level 1 to Level 2). The rights clearances work for a resource sometimes involved multiple rights holders, and it was not uncommon to pursue rights clearances through negotiations that included not only actors unions and talent guilds but also rights-holders for such elements as building sites and music.

Once the rights clearance work was complete, the production phase of the work began. If rights clearances had not been obtained for a particular segment or element of the content, it was sometimes necessary to reshoot that segment. Production work also entailed adjustments to the content such as segmenting the resources into smaller, stand-alone chunks to better accommodate an interactive audience’s ability to mix and remix. The production work also included the development of metadata for the content (abstracts, keywords, etc.) as well as supplemental materials such as discussion questions and lesson plans. Other necessary production tasks included fixing broken links and improving the graphics as needed. In terms of final editing, the project, established an iterative editing process in small batches, rather than

Lessons from the Field: Transitioning from Proprietary to Open Content

Evaluate the Collection—Assess which resources have the potential to be made open—legally, in terms of rights clearances; technologically, in terms of their ability to be, e.g., downloaded and remixed; and pedagogically, in terms of how well they meet current teaching and learning needs.

Document and Catalogue—Create a catalogue of your resources based on their rights and technology profiles

Pursue Clearances—Work with all third party rights holders and secure buy-in and clearance.

Produce the Content —Based upon learnings from the legal, pedagogical and technological assessment, work with the content to make it open.

Create Supplementary Materials for the Content—Create lesson plans and other accompanying materials, as well as metadata such as abstracts and keywords to accompany and define the materials.

Do Quality Control—Work with expert reviewers to control for quality and educational appropriateness of the resources, their metadata, and their accompanying materials.

whole collections, as a way to better facilitate workflow. Here, experts carefully reviewed each resource for educational appropriateness as well as for factual, grammatical, or typographical errors.

On the whole, the project found that that some types of content were easier than others to convert to open. For example, content created by local rather than national stations was easier to secure rights for, as there were fewer layers of complexity (for example, there were fewer large name, or famous individuals to secure rights from). Additionally, the project learned that had the content been produced with an eye toward open up front, the transition would have been easier in the end. Thus, while the project learned valuable lessons in the process of transitioning proprietary materials to open content, the project going forward plans to encourage the creation of open materials from the outset, by working more broadly in educating talent guilds, producers, and others up-front.

Summary of Case Study Insights

As illustrated by the Teachers' Domain case study, transitioning from proprietary materials to open content presents several complex challenges. To meet these challenges successfully, Teachers' Domain underscored the importance of preliminary assessments—legal, pedagogical, and technical—to assure consideration of all aspects and layers of proprietary materials prior to engaging further resources. As preliminary assessments prepare the groundwork for the licensing and for production work necessary to realize the transition to open content, they also help to assure maximum quality in the final resource.

Because of the costs involved in transitioning materials to open, Teachers' Domain plans to work more broadly in educating talent guilds, producers, and others, to encourage the creation of materials with an eye toward open from the outset.

C. Collaborative Content Creation

The purpose of many OER projects is to develop new resources that can be used, shared, and modified openly through peer production processes. The case studies of two projects examined peer production processes in detail: Free High School Science Texts in South Africa, and Training Commons in India. In addition, a third case study, CurriculumNet in Uganda, included some information about peer production.

For the purposes of this study, peer production is considered the participatory authorship of open content. This analysis of the case studies focused on workflow practices and mechanisms to support those practices.

Workflow

Free High School Science Texts (FHSST), Training Commons, and CurriculumNet adopted iterative processes of content development and a division of labor based upon the expertise of authors.

Free High School Science Texts

The overall purpose of FHSST was originally to develop an open science text for free use and adaptation by high schools in South Africa. As this purpose expanded to the development of four such textbooks (in physics, chemistry, life sciences, and mathematics), one of the challenges for the project was creating a workflow that divided the tasks effectively among authors and between authors and editors, and that could provide feedback to authors effectively.

For each textbook, FHSST enlisted teachers to develop overall outlines aligned to South Africa's curriculum guidelines. Working to create the textbooks from these outlines, FHSST developed an iterative process of three stages of content development. The first stage involved soliciting as much raw content as possible, often from teachers who were willing to contribute their teaching notes.

The raw content was then matched to the outlines, and any remaining gaps generated assignments, which were then parsed out to volunteer authors. During the initial stages of the project, people volunteered to complete large sections of text, such as chapters. However, FHSST soon found that many of the sections were not being completed within expected timeframes. As a result, FHSST began to divide volunteer tasks into smaller assignments, such as portions of chapters, drawings, illustrations, activities, and examples. FHSST noted that this adaptation facilitated volunteers' ability to consistently complete assignments within expected timeframes. When volunteers were ready to submit their content, they uploaded it to the FHSST content management system.

The second stage of the content development process involved a few selected editors providing an initial round of editing, as well as feedback to the volunteer authors. The editors focused on quality, alignment with curricular guidelines, omissions, ease of use, and other criteria. During this stage, unfinished sections could be submitted back into the pool for other volunteer authors to make new contributions.

The third stage of content development involved a final round of editing prior to completion of the textbook. FHSST indicated that it was important to have at least two full rounds of editing, in order to assure effective quality control.

Lessons from the Field: Collaborative Content Creation

Match Technology to Authors' Needs—

Continuously streamline the peer production platform and associated technologies in alignment with the authors' technological skills and practices.

Establish an Iterative Workflow Process—Instill and support an iterative cycle of writing, feedback, and editing, with short feedback cycles integrated throughout.

Keep Assignments Small—Break content assignments into manageable chunks to better assure completion and timeliness.

Support Both Online and Face-to-Face Mechanisms—Projects that promote or facilitate face-to-face meeting spaces alongside their online peer production platform will likely benefit from increased content contributions from authors.

Set Up Two-Way Communication Channels—Two-way, as opposed to top-down, management driven communication channels serve to support community engagement and continuous improvement of the content creation process as project participants are more likely to offer feedback for improvements, both informal and formal.

Allow for Peer Pressure—The group effect works. Authors who work together, especially in face-to-face settings, support one another's productivity and motivation.

As FHSST became more experienced through multiple rounds of content development, it found that some authors worked well independently to create high-quality content within optimal time frames, while others contributed content that did not meet the needs and requirements of the project (e.g., the writing level was for university students instead of high school students), or did not return completed assignments at all. FHSST responded to these challenges by developing shorter feedback cycles between editors and content authors throughout the writing process.

Training Commons

After three of the original 16 partners in the Training Commons decided not to move forward in contributing materials to the Commons, the project coordinators found among the remaining partners several authors to develop new training resources. The partners worked together to identify four key training areas for the telecentre managers, and the project formed core teams around each of the training areas with one lead organization in each area. The division of labor in terms of who would author each module came to be defined on the basis of the module author's expertise and background. The new authors did not have formal training in curriculum development, nor guidelines from which to base the curriculum, excepting their previous experience as trainers.

The curriculum was developed toward the target audience of telecentre managers, the majority based in rural areas, whose educational attainments ranged from functional literacy to masters' degrees. In addition, the telecentre models differed widely from each other with regard to their objectives and services rendered to the community. All these made the Training Commons project challenging and path breaking.

The main steps adopted for module development varied from module to module. If there were content already available, it was used as the basis for the module. If there were no content to begin with, the authors completed background research primarily on their own. During this process, they discussed their work with each other, formed online groups, examined each others' modules, and received informal feedback from each other. They also reviewed the requirements for telecentre managers to ensure that the modules aligned with these requirements in terms of content, language, and examples.

Templates of the modules were adopted in order to standardize the presentation of information. After a draft of each module was prepared in the template form, it was tested with a group of telecentre managers and trainers through a field test. Based on this feedback, revisions were made by authors, and the resulting modules were submitted for a second round of peer review through larger workshops of telecentre managers, trainers, outside experts, and others. Much of the feedback from these workshops focused on the need for simpler language, more concrete, real-life examples, and the use of visual illustrations. Based on feedback from these workshops, the authors revised the modules.

Finally, the modules were reviewed by two expert editors with backgrounds in curriculum development and with expertise in the telecentre field. The focus of the experts was to review the

content, language, and examples used from the perspective of telecentre managers, and to make suggestions for revisions, with particular attention to identifying curriculum gaps.

CurriculumNet

As with FHSST and Training Commons, CurriculumNet also featured iterative processes for content development. The overall goal of CurriculumNet was to develop and implement freely available e-learning materials in Uganda for primary and secondary schools.

Prior to developing the curriculum, CurriculumNet conducted a needs assessment study at the primary and secondary levels to identify subject areas that would most benefit from the development of new ICT-based materials. Through surveys and discussions with teachers, curriculum experts, and researchers, as well as school site visits, the needs assessment led to the identification of four content areas for potential development: social studies and math at the primary level, and geography and math at the secondary level.

In developing the curriculum, subject panels were established, encompassing a total of 18 curriculum experts who would create the curriculum. Each of the participants was trained in instructional design and in ICTs and then assigned to one of the four subject areas. The content creation process itself was both iterative and collaborative: After drafts of the content were written by the subject panel authors, they were revised by editing teams and further developed by multimedia experts before being tested by curriculum specialists and improved.

In terms of facilitating use and engagement around the curriculum materials, 150 teachers were trained on the use and basics of computers and the Internet, on the curriculum design process (to facilitate further development of the curriculum), and on how to deliver lessons using technology in their classrooms. Some of these trainings were conducted on site, so that the teachers' unique and diverse needs could be addressed, and so that their facilities and teaching environment could factor into tailored training programs.

Finally, the project subsequently established evaluation mechanism—including teacher surveys, school site visits, and workshops and meetings with researchers and curriculum experts—to monitor and evaluate the delivery and use of the materials in classrooms. The CurriculumNet project leader indicated that the materials were continuously updated and improved through this evaluation process

Summary of Case Study Insights

Based on the experiences of FHSST, Training Commons, and CurriculumNet, it is evident that processes for iterative peer review—with roles for content authors, editors, reviewers and the like—are important aspects of OER development projects. Furthermore, by engaging teachers, trainers, and others as peers in producing content, iterative peer review processes may produce the effect of transforming and expanding peer review roles. For example, the trainers who served as authors for Training Commons did not have formal curriculum development experience, yet were able to produce, in

working together, training materials based on their own experiences and expertise. And after receiving feedback from editors, they were able to improve the materials.

Furthermore, the cases revealed the importance of instilling and supporting an iterative cycle of writing, feedback, and editing, with short feedback cycles integrated throughout as a way to ensure content is continuously contributed, completed and checked for quality.

Mechanisms to Support Workflow

In order to support and sustain workflow, a mixture of online and more personalized, face-to-face interactions have proven central, especially for the FHSST and Training Commons projects. Contingent on project size, goals, and number of volunteers, the proportion of on-line and face-to-face tools varies. Whereas FHSST used primarily online tools reinforced by face-to-face interaction, Training Commons used primarily face-to-face and telecommunication tools, reinforced by minimal on-line tools. Both projects, through the use of a mixture of online and face-to-face tools, were able to facilitate the workflow and engagement of authors, editors, reviewers, etc.

Both projects found, however, that workflow supports need to be aligned with not only the technological expertise of the participating author community, but also the everyday work practices, preferences and communication channels of its members.

Free High School Science Texts

Since its inception, FHSST offered face-to-face work sessions in which volunteers in the same geographic area met together to develop content collaboratively and motivate each other to meet content creation targets. Because these sessions, called hackathons, were successful in bringing together volunteers around common objectives, they were later adopted and organized by individual volunteers as way to interact with others, renew their excitement about the project, motivate each other to create content, and answer each other's questions about content, the authoring process, and project technology. Several volunteers indicated that the hackathons were crucial in maintaining their motivation to create content. The importance of these face-to-face sessions in the content creation process was underscored by a FHSST founder who estimated that without the hackathons, the amount of FHSST content would have been reduced dramatically. FHSST also indicated that face-to-face sessions were crucial in contributing to a participatory culture that valued constructive, positive, and diverse feedback.

As another means to support its community of volunteers, the project established multiple online channels through which volunteers could communicate, ask questions, and suggest changes and improvements. These channels were structured so as to promote two-way as opposed to top-down, one-way communication. For example, FHSST established an online forum where volunteers could post questions, comments, or suggestions, and the FHSST leadership and administrative team could post announcements about upcoming hackathons and events, as well as questions to the volunteer community around future project improvements. The intention was to provide a space where targeted questions and answers could be asked, where volunteers could

feel confident that their questions were relevant and would receive serious answers, and where subsequent volunteers could find answers to their own questions by scanning or searching previous posts. However, creating such an environment required perseverance, as both the project founders and volunteers indicated that negative forum responses alienated volunteers, particularly those volunteers with limited experience in online forums.

Training Commons

In the early planning of the Training Commons curriculum development work, the idea was to create an online platform where module authors could contribute, share, modify and refine the content. As the module authors began to work together, the Training Commons project leaders decided to drop their plan for an online participatory platform, in part because the module authors were not accustomed to collaborating online.

The Training Commons project leaders recognized that they had to use a work-centered approach—a process that was familiar and comfortable to the module authors—to efficiently proceed, given the time limitation of four months. The project leaders thus placed more emphasis on individual authorship, face-to-face interactions, and email communication as a way of directing workflow. The project leaders indicated, however, that given more time, the project may have been able to train module authors to work with an online content creation platform.

Summary of Case Study Insights

The FHSST case study revealed that developing a positive and constructive online forum environment was important in maintaining volunteer motivation and supporting ongoing content contributions. Creating such an environment required perseverance, as both the project founders and volunteers indicated that negative forum responses alienated volunteers, particularly those volunteers with limited experience in online forums. To balance online interactions, face-to-face gatherings such as hackathons helped to contribute to a friendly and motivating culture of volunteers.

Both the FHSST and Training Commons case studies revealed the importance of creating workflow supports that are aligned to the everyday work practices, preferences and communication channels of the participating author community. For Training Commons, this meant altering its plan for an online content creation platform to favor a predominantly face-to-face and email-based process that supported the natural workflow of the module authors. For FHSST this entailed instilling and supporting face-to-face hackathons alongside its online mechanisms for supporting workflow, with the hackathons serving as crucial in contributing to a participatory culture that valued constructive, positive, and diverse feedback.

D. User Testing and Feedback

While peer production processes represent an important aspect of the development of OER, user testing and feedback provide both the context and direction for well-informed recursive

production. The case studies of two projects examined user testing and feedback processes in detail: Training Commons and Free High School Science Texts (FHSST). Through user testing, both projects solicited user feedback to incorporate into the process of OER development.

Training Commons

Beginning January 2007, Training Commons field-tested its curriculum modules with trainers across three geographic locations in India, to assess the relevance and usefulness of the draft content. The user testing revealed the need for several revisions: more case studies of successful telecentre operations; more examples of grassroots experiences from telecentre operations; explanations of basic theoretical concepts, such as the definition of “infomediary skills”; a local language translation; audio-visual aids; and video clippings of prior trainings or life experiences.

Alongside these needs, the field testing revealed that, due to the technicality of the curriculum language, most telecentre managers were unable to use the materials independently as a mechanism for self-training. Although the module authors had designed the curriculum specifically for the telecentre managers and to reflect the varying telecentre business models, the field-testing indicated that the Training Commons project had not yet adequately defined, understood, and incorporated users into its curriculum.

Later feedback revealed that although the curriculum still needed some modification, telecentre managers appreciated the revised training delivery methods, which included role-plays, interactive techniques, and PowerPoint presentations. Through these methods, the trainers were able to render the terms and concepts of the modules more accessible to the average telecentre manager, for many of whom the modules had previously felt overloaded with information. On another positive note, the modules appeared to positively impact the daily operations of telecentres. For example, one manager indicated that because of the marketing training received, he was able to enlist prospective students in his telecentre’s computer course, a prospect that enhanced the potential profitability of the telecentre.

Lessons from the Field: User Testing and Feedback

Define End Users—Define the end users of the content up front, which will help to shape the content as it is developed, which in turn will facilitate its usability and adaptability by those it is intended to serve.

Incorporate User Feedback Up Front—Solicit and incorporate user feedback early, in the draft stages of the content creation effort to further facilitate content localization, use and user engagement around content.

Factor User Testing Into Early Strategy and Deliverables Planning—Allow sufficient resources to support the process of obtaining pilot feedback from users. Make a realistic assessment of content needs, time, and other resources for user testing.

Free High School Science Texts

In order to ensure content relevancy, usability and adaptability to local teaching and learning needs, FHSST solicited feedback from the end users of its content early in the content creation process. Methods for obtaining user feedback included classroom trials and follow-up teacher workshops.

In early 2007, FHSST conducted classroom trials in order to gather user feedback from both teachers and learners to incorporate into subsequent revisions of the textbooks. For these trials, FHSST identified and partnered with eight Durban-area South African schools. The schools were identified through existing local networking channels of FHSST members. For example, one FHSST team member had attended one of the high schools. The FHSST team first met with the school personnel to introduce them to the classroom trial concept and to identify specific content needs in science and mathematics in the classrooms that would participate in the trials. The participating teachers were then provided with textbook content from FHSST in order to pilot-test the text's use over a two-month period. Both teachers and learners were given pre-trial questionnaires to gather baseline data about their perceptions of their current textbooks, and post-trial questionnaires to assess perceptions of the FHSST textbooks. The assessments included issues of readability, content, alignment to outcomes-based guidelines, and overall usability. A follow-up workshop was also conducted with teachers involved in the trials to report back on the findings from the post-trial questionnaire, and to delve deeper into the feedback received on the texts. Much of this feedback centered on the need to incorporate more examples and activities into the texts, augment lab experiments to account for the limited resources and lab equipment within the schools, and simplify the language of the text.

After the trials and workshops, FHSST created a list of high-priority raw content and editing needs to address the feedback received from the teachers and learners. Specific changes that resulted from the teacher and learner feedback included revisions of lab exercises to account for lack of school resources. For instance, exercises were rewritten to incorporate homemade equipment, that were in fact available in classrooms. Other, more global, changes included the development of new content authoring tools and templates on the FHSST website to support the ability to add examples, illustrations, and activities to the textbooks. In addition, FHSST recruited and paid small stipends to four teachers who would serve as experts during the final round of textbook editing to ensure adherence to the outcome-based syllabi, as well as other appropriate user needs. In a country where its teachers are not particularly well-paid, these types of stipends played a significant role in the ability to recruit additional expertise to FHSST.

While classroom trials proved instrumental in helping FHSST to confirm and identify content areas in need of improvement, thereby strengthening the quality of its textbooks, as well as their adaptability for use in local teaching and learning situations, the resources required for obtaining user feedback exceeded projected expectations. Because preparing preliminary content for the FHSST teacher trials was exceedingly time-consuming, and the teachers did not use all of the content that they said they would need, a more realistic assessment of content needs would be required for future teacher trials. Because the teacher trials significantly impacted overall project deliverables, FHSST noted that it would have been better to have factored them into the early strategy and deliverables planning.

Summary of Case Study Insights

As revealed by the Training Commons and FHSST case studies, incorporating feedback from users early on, in the draft stages of content creation effort, helps to facilitate localization of content and differentiation of content among key types of users. As

demonstrated by the early version of the Training Commons modules, in which the content exceeded the capacities of an intended audience, the feedback process should carefully define or profile end users up front. Moreover, as revealed by the experiences of FHSST, a realistic assessment of the cost of obtaining user feedback should be factored into early planning.

E. Use and User Engagement

Finding ways to support and continuously engage communities around the use, creation, and sharing of open tools and resources is central to project sustainability for many OER initiatives. The case studies of Teachers' Domain and Curriki specifically examined issues surrounding use and user engagement. Both projects sought to understand how users engage around their project tools and open resources, and what factors help or hinder engagement and use. Both conducted surveys and interviews and gleaned common learnings, as discussed below.

Teachers' Domain and Curriki

The case studies of both Teachers' Domain and Curriki revealed that the utilization of the respective sites tended to be highest in terms of the least time-intensive and minimally complex activities like viewing and downloading resources, and lowest with more complex tasks like sharing and editing content. However, more complex tasks were found to be more prevalent among active users on both sites (users who visit the site daily or weekly). For example, active Curriki users were more likely to visit Curriki to contribute resources than other users. Active users of Teachers'

Domain were more likely to share resources with others, and to use resources with their students in their classrooms than other users. Not surprisingly, these findings suggest that those in the active user category are not only visiting the site more regularly, but are engaging with the site and using the resources in a more in-depth manner than other users.

User experiences with Teachers' Domain and Curriki illuminate the incentives and disincentives for use of open tools and resources. The conditions that were highlighted by users as facilitating the use of the sites' respective resources were primarily related to the quality and usability of the content of resources. Teachers' Domain users described how the ease of understanding the content, both for themselves and their students, was an important factor. Also noted was the desire for access to resources not otherwise available in the classroom. Curriki users' experiences with connecting with teachers and learners on the site were reported as important incentives for Curriki use, particularly the ability to view and track the resources tied to specific, trusted users as a way to find quality resources. Interestingly, a participant who contributed content to Curriki

Lessons from the Field: Use and User Engagement

Continuously Assess User Needs—Assess the needs of users on an ongoing basis so that tools and supports for facilitating use and engagement can be continuously adapted, updated, or improved where necessary to meet those needs.

Explore Ways to Support Users—Find ways to support users who may want to engage in more complex activities such as content creation, remixing and localization, but who may lack the knowledge or supports at their local institutions to do so.

Enhance User Interactivity—Develop and promote ways to allow users to communicate, collaborate, and interact with other users who have similar interests or who can lend to knowledge sharing.

indicated an interest in knowing whether and how one's own resource contributions were being viewed, modified, or downloaded by others, to ensure they are useful to them.

However, a primary barrier to use for both cases was technical in nature. Both Curriki and Teachers' Domain users experienced technical difficulties, particularly in terms of the organization and layout of the sites, and in finding, viewing, using, sharing, or creating resources. Curriki and Teachers' Domain users also reported difficulty knowing whether a resource is of high quality and knowing how to use the resources in the classroom.

An additional disincentive for use concerned the licensing restrictions of some of the resources provided; Teachers' Domain and Curriki users reported that knowing whether they had permission to use, change, or modify resources was a barrier to using tools and resources.

Finally, the case studies pointed to teachers' lack of institutional and training supports at their local institutions as an obstacle to OER use and engagement. Limited access to computers in the classroom and uncertainty about whether students had computers at home dissuaded users from using the resources in the classroom. Lack of support by school administrators in terms of offering the tools and trainings needed to facilitate heightened use of OER in the classroom was also reported to be a disincentive to OER use and engagement.

Summary of Case Study Insights

The Teachers' Domain and Curriki case studies highlighted the importance continuing to offer new and relevant resources, as users visit the respective sites primarily to supplement existing course materials and to find ideas for new lessons. Additionally, because complex engagement behaviors such as remixing, editing, and using OER in the classroom appeared less prevalent for both sites (with the exception of more active users), finding ways to support users who may want to engage in these more complex activities, but who may lack the knowledge or supports to do so becomes central to promoting increased user engagement. Importantly, these supports should potentially move beyond mitigating design and technology hurdles related to the organization and layout of sites. That is, in light of the case study findings revealing that teachers' lack of institutional and training supports at their local institutions is an obstacle to OER use and engagement, these supports should also potentially include mechanisms to facilitate OER engagement in the context of teachers' local teaching and learning environments.

Finally, the Curriki case study in particular pointed to the importance of interactions between users. Specifically, in light of findings that teacher and learner connections are powerful incentives to using the Curriki site, there is a need to more fully understand the ways in which teachers are or could be connecting with one another through the site. Doing so can serve to support the creation of additional mechanisms to continue to attract new users, as well as to support existing users.

F. Financial Sustainability

For many OER projects, ongoing financial support from foundations and other philanthropic entities may not be possible or at the very least, not sustainable over time. Projects are thus faced with the task of exploring other ways to support their activities. The Stanford Encyclopedia of Philosophy (SEP) is one such project, which has explored and implemented an alternative funding model to support its move away from its initial grant-based funding structure. The cases of CurriculumNet and Free High School Science Texts (FHSST) also addressed issues of financial sustainability, although to a lesser degree. Each is discussed in turn, below.

Stanford Encyclopedia of Philosophy

In line with its effort to become a self-sustaining resource that preserves open access, Stanford Encyclopedia of Philosophy (SEP) has developed an endowment model predicated on partnerships between Stanford University and umbrella organizations representing the global academic library community. Under the model, university libraries that have philosophy departments make a voluntary contribution to an endowment supporting SEP, in return for certain benefits, including protection on the money contributed, the right to download the SEP archives, and public recognition as supporters of open access and SEP. The goal has been to raise \$2.5 million from the library community (alongside additional sums from a challenge grant and private and corporate donors), so that SEP can remain freely available to scholars, students, and the public at large. Although SEP has successfully secured commitments from libraries at universities with philosophy departments globally, at the time of the case study, approximately one-third of its necessary funding remained to be raised. A central obstacle identified by SEP has been securing new partnerships with libraries that use SEP and its philosophy resources, but that do not contribute to the fund.

The case study revealed on the whole that an alternative funding model and its options should be sufficiently flexible and responsive to adapt to the various needs, practices and structures of key stakeholders and contributing funders. A challenge for SEP has been adapting to the internal buying and invoicing structures of libraries which are in some ways confined to a subscription model, despite messaging that emphasizes the long-term economic benefit of a single payment or fixed installment of membership dues to support the SEP endowment model. Librarians and representatives library organizations interviewed for this case study viewed a subscription fee as more feasible for libraries because it allowed for smaller, staggered payments

Lessons from the Field: Financial Sustainability

Address Long-term Financial Sustainability—Address long-term financial sustainability early on in a project's lifecycle, as a way to ensure that project goals, both existing and new, can be met and sustained over time.

Consider the Full Range of Possible Funding Sources—Explore and assess the viability of all possible funding sources, as a way to map the funding landscape for your project.

Assess Stakeholder Needs—Assess the needs of stakeholders in terms of their requirements or existing structures—as those needs will likely impact your funding strategy.

Leave Room for Adaptation—A targeted funding plan and model that is aligned to project goals is central; but finding ways to incorporate flexibility to meet the needs of stakeholders and of surprises as the environment changes is also important.

as opposed to the larger sum or fixed installment series required by the SEP's endowment model—a consideration especially important to smaller libraries that have minimal purchasing budgets.

The case study resulted in additional insights regarding the SEP funding model and project messaging. For instance, despite documented use of SEP from across a broad spectrum of academic departments, for many universities and their libraries, the field of philosophy is still perceived as department competing with other academic departments, and thus, with budgeting priorities for departmental funding allocations. Furthermore, the case study revealed a concern among libraries regarding the issue of how to maintain and assure the quality of the resources under the model—for an upfront payment model does not provide the option to review and renew on a periodic basis.

In response to these issues, SEP has continued to adapt its model. For example, in response to the concern about quality control, SEP plans to establish a governing board that will include representatives from the library community and who will therefore obtain influence over the quality and quality control of the SEP resource. SEP is also exploring additional sources of funding which were not originally or explicitly targeted, such as university libraries that do not have philosophy departments and smaller libraries that may have less bureaucracy and may be able to respond more easily to a non-subscription funding model.

CurriculumNet

According to CurriculumNet's project leader, the project's instructional materials have been implemented in 13,000 primary schools and in 5,000 secondary schools in both urban and semi-urban areas where electricity is available. The successful implementation of the curriculum development process has led to additional requests for the design of biology, chemistry, physics, and math curriculum at higher levels. In light of these requests and its original aim to support the growing student population in Uganda, CurriculumNet has proposed three new goals for continuing its work: 1) to continue the development and production of ICT-based learning materials, primarily in science at the secondary level; 2) to restructure and establish a fully functioning multimedia production center; and 3) to develop and deploy an interactive educational portal for Ugandan schools, where teachers and learners can access the materials and collaboratively develop and modify them to meet local teaching and learning needs. In addition, CurriculumNet aims to continue to distribute ICT-based materials (both online and offline) throughout urban and rural schools in Uganda.

The CurriculumNet case study revealed that a central challenge to sustaining CurriculumNet's activities and reaching its newly defined goals stems from lack of adequate funding. The project originally received three years of funding from IDRC to develop and implement CurriculumNet, which supported the project from September 2002 to August 2005. The project then received an 18-month extension from IDRC, taking its support into 2006. According to CurriculumNet, funding challenges have hampered CurriculumNet in moving forward with its curriculum development work. Although Microsoft East Africa has provided additional support, it accounts for only about one-sixth of what the project needs to reach its new goals.

To address this issue in part, the CurriculumNet indicated an interest in receiving support not only in terms of funding, but in terms of building the project team's capacity to identify potential funders and write successful grant proposals. Additionally, the project has sought and successfully secured the integration of CurriculumNet into the Ministry of Education's five-year strategic plan, indicating its role and importance in meeting curriculum needs for Ugandan schools, which can in turn help to facilitate future financial support.

Free High School Science Texts

The Free High School Science Texts project was a volunteer-based endeavor from the outset. As the project progressed and grew, it found that all of its work could not be accomplished solely through volunteers, as there were real and ongoing costs that needed to be met. As FHSST began to explore funding possibilities, they found that fundraising was itself an iterative process of development and adaptation. In 2004, two years after the project's inception, FHSST approached a potential funder through an initiative that sought to match education projects with sponsors. At that time, FHSST sought to cover the costs of the classroom trials, pay external editors to ensure content quality, and cover the costs of the printing and distribution of the books. It was understood early on that the majority of the FHSST textbook dissemination and use would necessarily be through print copies, due to a lack of Internet connectivity, computers, and electricity in parts of South Africa. Although FHSST was not successful in securing funding through this initiative and with this approach, the project did begin to build a relationship with an eventual funder.

In 2005, FHSST approached the funder directly with a different approach, requesting support for full-time project employees. During this process, FHSST discovered that many funders preferred to tie funding directly to clearly-defined deliverables. FHSST revised its approach by requesting a specific amount of support for the development of a number of edited textbook pages per month, for activities such as classroom trials and teacher workshops, and for content development competitions. No money was requested for printing and distribution of the textbooks. In adopting this approach, FHSST received the support needed to develop the textbooks.

At the time of this report, FHSST still has outstanding needs for external funding—specifically the printing and distribution of the math and physical science books and for continuing administration aspects of the project while it completes the remainder of its life sciences textbook. For this second round of funding, FHSST plans to approach corporations with strong social investment records in South Africa.

Summary of Case Study Insights

The cases of CurriculumNet and FHSST reveal the importance of addressing long-term financial sustainability early on in a project's lifecycle. As initial funding came to a close for CurriculumNet, and it formulated new goals for curriculum development moving forward, the project faced the central challenge of acquiring additional funding. Although the project successfully secured its role in the long-term strategic plan of its parent organization within the Ministry of Education, going forward, it was confronted with the

challenge of exploring new sources of funding and building internal capacity to potentially develop alternative funding models. Similarly, the case of FHSST revealed the importance of long-term planning around funding—as the project, at the close of the case study, had outstanding needs for funding and was in the process of seeking a second round of financial support.

The SEP case study, with regard to its innovative endowment model for funding the project, revealed an additional important insight—namely that funding models and messaging strategies need to be flexible enough to address the sometimes changing needs of the key stakeholders upon whose support they depend. More specifically, the SEP case study demonstrated the importance of carefully assessing the needs of financial contributors, and maintaining sufficient flexibility to allow their needs to be easily integrated.

IV. Conclusions

On the whole, the findings of the case studies imply that an important aspect of OER project sustainability involves the implementation of practices that replicate the characteristics of open educational resources themselves: namely, those that are shared, collaborative and peer-based, and that invite continuous improvement by stakeholders. More specifically, the case study learnings reveal the importance of assessing and incorporating stakeholder needs—from users and partners, to sponsors—into project planning and ongoing refinement of all stages of the project’s work, from securing buy-in and assuring quality, to financially sustaining the project.

In presenting the case studies and the learnings from them, this report has sought to inform the field at large by contributing new knowledge as a basis for reflection on methods for project sustainability. Recognizably, the shape, size, goals and dynamics of each and every open educational resources initiative will vary. The key is to understand what is unique about a project, and draw upon, adapt and localize lessons from the field such as those offered here to support individual efforts.

Furthermore, in light of the participatory methodology used to conduct the case studies, and the overreaching aim to support projects toward continuous improvement, this case study project—through the insights gleaned and shared—reveals the importance of building capacity within projects to conduct ongoing assessments of practices, and to document, integrate, and share the resulting learnings both internally and externally with the wider community. The work that lies ahead is to further facilitate and support projects’ ability to document and share their learnings, so that they, as well as the community at large, can continue to benefit as they endeavor to create, do and sustain the process of OER.

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